[0017]Importantly, the spinal and upper cervical impulse treatment device has built-in data validation, so that operation may not commence, until proper alignment of the device head is achieved. This is superior to a situation where correct alignment relies on human recognition of visual feedback mechanisms and operation may be triggered at any time. Accuracy is further improved by use of a digital controller and precision voice coil actuators, rather than components with variable output behavior, like solenoids. The linear force delivered is sinusoidal, and does not have the overshoot, bounce or harmonic characteristics of square waves, and, therefore, is a superior means of applying force for ~~chiropractic~~ spinal and upper cervical adjustments.

[0036]FIG. 3 illustrates additional components of the device head, as needed for an electronic device. An optional cooling fan 72 is shown on the right and a large heat sink 76 and power supply 74 are shown on the left. The large heat sink 76 is connected to the transducer frame 60 to dissipate transducer heat and it is connected to the power supply 74, another heat source in the device. The heat sink is aluminum and relatively light for its size, but weight is not a major issue, since the device head is mounted on a fixed stand. The size of the heat sink enables excellent heat dissipation, which is a concern in a ~~chiropractic~~ medical device. A controller 22, comprised of a touchscreen 26 and electronics motherboard 70, is shown at the top. Components may appear in alternate locations in different device embodiments, although a shielded housing 62 will always be on the outside. The collapsible stylus 30 will always have a linear axis with a measured direction and this will most often be placed approximately along the centerline of the transducer 24 component.

[0040]Sinusoidal waveforms are used for both linear and rotational impulses. A typical, sine wave 80 is shown in the top half of FIG. 4. The smooth nature of the curve is noted, in contrast to the abrupt, and imperfect square wave 82 below. The smooth sinusoidal waveform is judged to be superior for ~~chiropractic~~ medical applications. The accepted industry technique for generating analog waveforms, and sinusoidal waveforms 80 in particular, is known as Pulse Width Modulation (PWM). Creation of analog waveforms using PWM and low pass filters is well known and well documented. Many companies manufacture and sell controllers or microprocessors that incorporate waveform tables and supply cookbook descriptions of analog waveform generation. Practical low pass filter circuits and their characteristics are included in the documentation. In brief, a high frequency digital output has its duty cycle

modified to reflect an analog data value, like a point on a sine wave. This PWM pulse then travels through a low pass filter. The resultant signal carries the desired analog waveform, without use of a digital to analog converter (DAC). The impulse frequencies sought in the current invention are low, and a simple one-stage low pass filter, comprised of a resistor and capacitor, is sufficient to obtain a sine wave 80.

[0043]To recap, the use of a controller and PWM approach allows the creation of any complex waveform less than the 40 KHz range of the voice coil actuator. The selected waveform for the preferred embodiment of the invention is a linear frequency ramp or chirp, which cycles through 50 Hz to 100 Hz as shown in FIGS. 5 and 6. Square waves 82 will not be implemented in the current invention. A smooth sinusoidal waveform, like one with gradually increasing frequency, is viewed as an ideal impulse waveform for ~~chiropractic~~ medical treatments.

[0046]A desired treatment angle is determined by a practitioner on the basis of morphological data such as x-rays, physical examination, other inputs, and considerable clinical experience. Practitioners will record and track the efficacy of selected treatment angles across many patients and many situations. It is important to apply linear impulses at a correct treatment angle to obtain consistent results.

[0053]Automated data input is an optional but integral part of the spinal and upper cervical impulse treatment, device. A graphics tablet 42 is used to capture information from x-rays and overlaid, diagrams or other diagrams. The input is digitized, allowing the data to be manipulated by computer algorithms. An experienced ~~chiropractic~~ medical practitioner has defined the calculations needed to produce the correct preset treatment angle 110. This is matched by the actual angle 36 of the linear axis of the impulse stylus in three dimensions. Other treatment parameters, such as linear and rotational impulse parameters, defining frequency and energy, are then added to fully define the spinal and upper cervical impulse treatment for a particular patient.

[0057]Accordingly, while this invention has been described with reference to illustrative embodiments, this description is not intended to be construed in a limiting sense. Various modifications of the illustrative embodiments, as well, as other embodiments of the invention, will be apparent to persons skilled in the art upon reference to this description. For example, any connector that

provides the functionality of the horizontal arm and stand coupling may be used, as can any actuator or rotator for driving the stylus in the specified direction. It is therefore contemplated that the appended claims will cover any such modifications or embodiments as fall within the true scope of the invention.